

CLAIMS

What is claimed is:

1. A microelectromechanical system for controlling the temperature of a heat-generating component, comprising:

a magnetic heat sink device;

a temperature sensor; and

control circuitry;

wherein the temperature sensor detects the temperature of the heat-generating component through the heat sink device and feeds the sensed temperature to the control circuitry.

2. The system of claim 1, wherein the heat-generating component comprises a laser.

3. The system of claim 2, wherein the laser comprises a laser diode.

4. The system of claim 1, wherein the control circuitry comprises a processor.

5. The system of claim 1, wherein the control circuitry compares the sensed temperature against a predetermined temperature set point.

WORKMAN NYDEGGER
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

6. A method for controlling the temperature of a heat-generating component, comprising:

providing a magnetic heat sink device having a temperature sensor;

detecting the temperature of the heat-generating component through the temperature sensor;

feeding the detected temperature to control circuitry; and

comparing the detected temperature against a predetermined temperature set point.

7. The method of claim 6, wherein the heat-generating component comprises a laser.

8. The method of claim 7, wherein the laser comprises a laser diode.

9. The method of claim 6, further comprising sending a command to the magnetic heat sink device to take more heat out of the heat-generating component when the detected temperature is higher than the temperature set point.

10. The method of claim 6, further comprising sending a command to the magnetic heat sink device to take less heat out of the heat-generating component when the detected temperature is lower than the temperature set point.

11. A microelectromechanical heat sink device, comprising:

a laser system comprising:

a laser mount having a first surface and an opposing second surface; and

a laser diode coupled to the first surface of the laser mount;

one or more magnetic plates attached to the second surface of the laser mount;

an actuator system comprising:

a plurality of actuator plates; and

one or more magnetic components; and

a heat sink material disposed between the laser system and the actuator system, the heat sink material comprising one or more fingers;

wherein when the laser diode generates more heat than can be handled by the laser mount alone, the heat sink material attaches to the magnetic plates when a current flows through the actuator plates to provide additional heat sink volume.
12. The heat sink device of claim 11, wherein the laser mount comprises a material selected from the group consisting of silicon, brass, and a low CTE lead frame alloy.
13. The heat sink device of claim 11, wherein the magnetic plates comprise a permanent magnet.

14. The heat sink device of claim 13, wherein the permanent magnet comprises iron.

15. The heat sink device of claim 11, wherein the actuator plates comprise a low temperature co-fired ceramic material.

16. The heat sink device of claim 11, wherein the fingers comprise silicon coated with a heat-conducting material.

17. The heat sink device of claim 16, wherein the heat-conducting material comprises copper.

18. The heat sink device of claim 11, wherein the fingers are part of a silicon wafer.

19. The heat sink device of claim 11, further comprising a permanent magnetic material on a portion of the one or more fingers.

20. The heat sink device of claim 19, wherein the permanent magnetic material comprises SmCo.

WORKMAN NYDEGGER
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111